What is claimed is:

1   1.   A method of detecting a seizure, comprising

2   the steps of:

3   a)   dividing   a   digitized   waveform   of   an

4   electroencephalogram (EEG) recording into a plurality

5   of epochs each having a first predetermined duration;

6   (b)   computing   matching   pursuit   for   a   given

7   one of the epochs to obtain a plurality of seizure

8   atoms;

9   (c)   describing   the   seizure   atoms   and   the

10   given epoch with at least one neural network (NN) rule;

11   (d)   applying connected-object clustering to

12   the   epochs   in   a   sliding   window   of   a   second

13   predetermined duration to obtain a clustering result;

14   and

15   (e)   establishing   a   seizure   point   from   the

16   clustering result.

1   2.   The method of claim 1, further comprising the

2   step of determining whether the seizure point is valid.

1   3.   The method of claim 1, further comprising the

2   steps of repeating steps (b)-(e) and determining

3   whether a succeeding seizure point is better than a

4   preceding seizure point.

1   4.   The method of claim 1, wherein the first

2   predetermined duration is less than the second

3   predetermined duration.

1   5.   The method of claim 4, wherein the first

2   predetermined duration is about 2 seconds.

1   6.   The method of claim 4, wherein the second

2   predetermined duration is about 60 seconds.

1   7.   The method of claim 1, further comprising the

2   step of setting an initial time T=0 prior to the step

3   of computing matching pursuit for the given epoch.

1   8.   The method of claim 7, further comprising the

2   steps of determining whether unprocessed EEG data is

3   available at the time T, and causing a time delay of a

4   third predetermined duration if unprocessed EEG data is

5   unavailable at the time T.

1   9.   The method of claim 8, wherein the digital

2   waveform is one of a plurality of waveforms forming a

3   montage of the EEG recording, the method further

4   comprising the steps of obtaining a subsequent waveform

5   of the EEG recording and repeating steps (b)-(e) if

6   unprocessed EEG data is available at the time T.

1   10.   The method of claim 9, further comprising the

2   step of establishing a seizure event with a plurality

3   of proximal seizure points from the waveforms of the

4   montage.

1   11.   The method of claim 10, further comprising

2   the step of determining whether the seizure event is

3   valid.

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1   12. The method of claim 11, further comprising

2   the step of notifying a user that a seizure is

3   identified if the seizure event is valid.

1   13. The method of claim 12, further comprising

2   the step of saving the time T and a description of the

3   seizure.

1   14. The method of claim 11, further comprising

2   the steps of adding a time of the third predetermined

3   duration to the time T and shifting the sliding window

4   by the time of the third predetermined duration until

5   the EEG recording is finished.

1   15. The method of claim 14, wherein the third

2   predetermined duration is about 1 second.

1   16. A computer readable medium comprising a

2   plurality of instructions, which when executed by a

3   computer, cause the computer to perform the steps of:

4   (a) dividing a digitized waveform of an

5   electroencephalogram (EEG) recording into a plurality

6   of epochs each having a first predetermined duration;

7   (b) computing matching pursuit for a given

8 one of the epochs to obtain a plurality of seizure

9 atoms;

10   (c) describing the seizure atoms and the

11 given epoch with at least one neural network (NN) rule;

12   (d) applying connected-object clustering to

13 the epochs in a sliding window of a second

14 predetermined duration to obtain a clustering result;

15 and

16   (e) establishing a seizure point from the

17 clustering result.

1   17. The computer readable medium as set forth in

2 claim 16, further comprising instructions which cause

3 the computer to perform the step of determining whether

4 the seizure point is valid.

1   18. The computer readable medium as set forth in

2 claim 16, further comprising instructions which cause

3 the computer to perform the steps of:

4   repeating steps (b)-(e); and

5   determining whether a succeeding seizure

6 point is better than a preceding seizure point.

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1　　　　　　19.　The computer readable medium as set forth in

2　　claim 16, wherein the first predetermined duration is

3　　less than the second predetermined duration.

1　　　　　　20.　The computer readable medium as set forth in

2　　claim 19, wherein the first predetermined duration is

3　　about 2 seconds.

1　　　　　　21.　The computer readable medium as set forth in

2　　claim 19, wherein the second predetermined duration is

3　　about 60 seconds.

1　　　　　　22.　The computer readable medium as set forth in

2　　claim 16, further comprising instructions which cause

3　　the computer to perform the step of setting an initial

4　　time T=0 prior to the step of computing matching

5　　pursuit for the given epoch.

1　　　　　　23.　The computer readable medium as set forth in

2　　claim 22, further comprising instructions which cause

3　　the computer to perform the steps of:

4　　　　　　　　determining whether unprocessed EEG data is

5　　available at the time T; and

6   causing a time delay of a third predetermined

7   duration if unprocessed EEG data is unavailable at the

8   time T.

1   24. The computer readable medium as set forth in

2   claim 23, wherein the digitized waveform is one of a

3   plurality of waveforms of the EEG recording which

4   includes a montage of multiple channels of simultaneous

5   waveforms, the computer readable medium further

6   comprising instructions which cause the computer to

7   perform the steps of:

8   obtaining a subsequent waveform of the EEG

9   recording; and

10   repeating steps (b)-(e) if unprocessed EEG

11   data is available at the time T.

1   25. The computer readable medium as set forth in

2   claim 24, further comprising instructions which cause

3   the computer to perform the step of establishing a

4   seizure event with a plurality of proximal seizure

5   points from the waveforms of the montage.

1   26. The computer readable medium as set forth in

2   claim 25, further comprising instructions which cause

3   the computer to perform the step of determining whether

4   the seizure event is valid.

1   27. The computer readable medium as set forth in

2   claim 26, further comprising instructions which cause

3   the computer to perform the step of notifying a user

4   that a seizure is identified if the seizure event is

5   valid.

1   28. The computer readable medium as set forth in

2   claim 27, further comprising instructions which cause

3   the computer to perform the step of saving the time T

4   and a description of the seizure.

1   29. The computer readable medium as set forth in

2   claim 26, further comprising instructions which cause

3   the computer to perform the steps of:

4   adding a time of the third predetermined

5   duration to the time T; and

6   shifting the sliding window by the time of

7   the third predetermined duration until the EEG

8   recording is finished.

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1   30. The computer readable medium as set forth in

2   claim 29, wherein the third predetermined duration is

3   about 1 second.

1   31. An article of manufacture, including a

2   computer readable medium having computer readable

3   program code means embodied therein for detecting a

4   seizure, the computer readable program code means in

5   the article of manufacture comprising:

6   (a) computer readable program code means for

7   dividing a digitized waveform of an

8   electroencephalogram (EEG) recording into a plurality

9   of epochs each having a first predetermined duration;

10   (b) computer readable program code means for

11   computing matching pursuit for a given one of the

12   epochs to obtain a plurality of seizure atoms;

13   (c) computer readable program code means for

14   describing the seizure atoms and the given epoch with

15   at least one neural network (NN) rule;

16   (d) computer readable program code means for

17   applying connected-object clustering to the epochs in a

18   sliding window of a second predetermined duration to

19   obtain a clustering result; and

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20   (e)   computer readable program code means for

21   establishing   a   seizure   point   from   the   clustering

22   result.

1   32.   The article of manufacture as set forth in

2   claim 31, wherein the computer readable program code

3   means further comprises computer readable program code

4   means for determining whether the seizure point is

5   valid.

1   33.   The article of manufacture as set forth in

2   claim 31, wherein the computer readable program code

3   means further comprises:

4   computer readable program code means for

5   repeating steps performed by computer readable program

6   code means (b)-(e); and

7   computer readable program code means for

8   determining whether a succeeding seizure point is

9   better than a preceding seizure point.

1   34.   The article of manufacture as set forth in

2   claim 31, wherein the first predetermined duration is

3   less than the second predetermined duration.

1   35. The article of manufacture as set forth in

2 claim 34, wherein the first predetermined duration is

3 about 2 seconds.

1   36. The article of manufacture as set forth in

2 claim 34, wherein the second predetermined duration is

3 about 60 seconds.

1   37. The article of manufacture as set forth in

2 claim 31, wherein the computer readable program code

3 means further comprises computer readable program code

4 means for setting an initial time $T=0$ prior to

5 computing matching pursuit for the given epoch.

1   38. The article of manufacture as set forth in

2 claim 37, wherein the computer readable program code

3 means further comprises:

4   computer readable program code means for

5 determining whether unprocessed EEG data is available

6 at the time T; and

7   computer readable program code means for

8 causing a time delay of a third predetermined duration

9 if unprocessed EEG data is unavailable at the time T.

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1   39. The article of manufacture as set forth in

2   claim 38, wherein the digitized waveform is one of a

3   plurality of waveforms of the EEG recording which

4   includes a montage of multiple channels of simultaneous

5   waveforms, and wherein the computer readable program

6   code means further comprises:

7   computer readable program code means for

8   obtaining a subsequent waveform of the EEG recording;

9   and

10   computer readable program code means for

11   repeating steps performed by computer readable program

12   code means (b)-(e) if unprocessed EEG data is available

13   at the time T.

1   40. The article of manufacture as set forth in

2   claim 39, wherein the computer readable program code

3   means further comprises computer readable program code

4   means for establishing a seizure event with a plurality

5   of proximal seizure points from the waveforms of the

6   montage.

1   41.   The article of manufacture as set forth in

2   claim 40, wherein the computer readable program code

3   means further comprises computer readable program code

4   means for determining whether the seizure event is

5   valid.

1   42.   The article of manufacture as set forth in

2   claim 41, wherein the computer readable program code

3   means further comprises computer readable program code

4   means for notifying a user that a seizure is identified

5   if the seizure event is valid.

1   43.   The article of manufacture as set forth in

2   claim 42, wherein the computer readable program code

3   means further comprises computer readable program code

4   means for saving the time T and a description of the

5   seizure.

1   44.   The article of manufacture as set forth in

2   claim 41, wherein the computer readable program code

3   means further comprises:

4   computer readable program code means for

5   adding the time of the third predetermined duration to

6   the time T; and

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7   computer readable program code means for

8   shifting the sliding window by the time of the third

9   predetermined duration until the EEG recording is

10 finished.

1   45. The article of manufacture as set forth in

2   claim 44, wherein the third predetermined duration is

3   about 1 second.